

# PRESCRIBED FIRE A VITAL TOOL FOR WILDLIFE MANAGEMENT



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## Managing Forest for Wildlife

- Tools
  - Thinning
  - Prescribed Fire
  - Disking
  - Herbicide
  - Grazing

*"The central thesis of game management is this: game can be restored by the creative use of the same tools which have heretofore destroyed it - ax, plow, con, fire, and gun. Management is their purposeful and continuing alignment."*

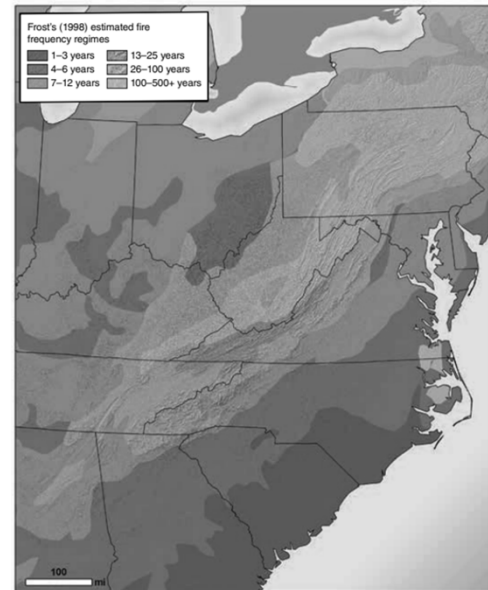


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## Historic Fire Regimes

- High Frequency → Coastal Plains



Lafon et al. 2017: [www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs219.pdf](http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs219.pdf)

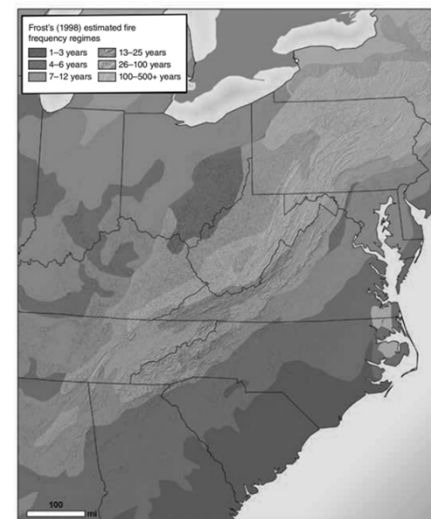


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## Historic Fire Regimes

- High Frequency → Coastal Plains
- Lowest Frequency → Interior Appalachians



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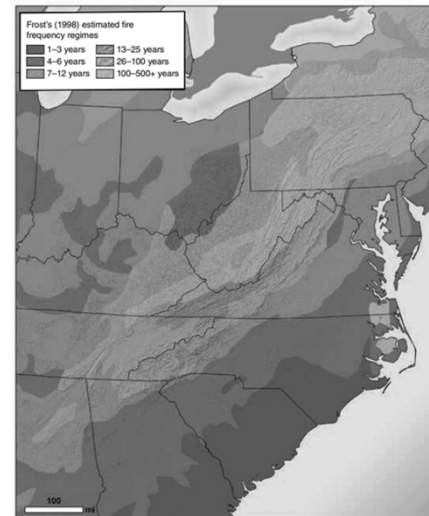
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## Historic Fire Regimes

- High Frequency → Coastal Plains
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### Within Appalachians

- Highest Frequency → Eastern / Western edges



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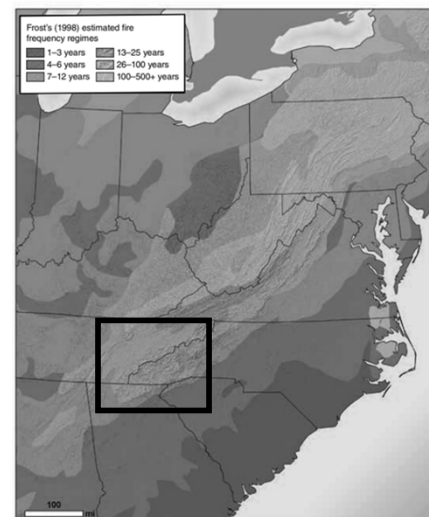
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## Historic Fire Regimes

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## Historic Fire Regime

- Southern Appalachian Mixed Pine-Oak Forests

- Average fire interval: 11.4

	Mean Fire Interval	Range
Tennessee	7.2	1-19
Great Smokey Mtn. NP	6.5	2-19
North Carolina	9.2	1-27
Regional	11.4	4-18

Flatley et al. 2013: <https://doi.org/10.1890/12-1752.1>



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## Historic Fire Regime

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## Historic Fire Regime

- Southern Appalachian Mixed Oak-Pine Forests

- Average fire interval: 11.4
- Range 4 – 18 years
- $\frac{3}{4}$  of confirmed fires were in dormant season

	Dormant Season (%)	Earl Season (%)	Late Season (%)
Tennessee	75.4	23.72	0.89
Great Smokey Mtn. NP	90.6	8.98	0.40
North Carolina	75.2	24.80	0.00

Flatley et al. 2013: <https://doi.org/10.1890/12-1752.1>



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## Historic Fire Regimes

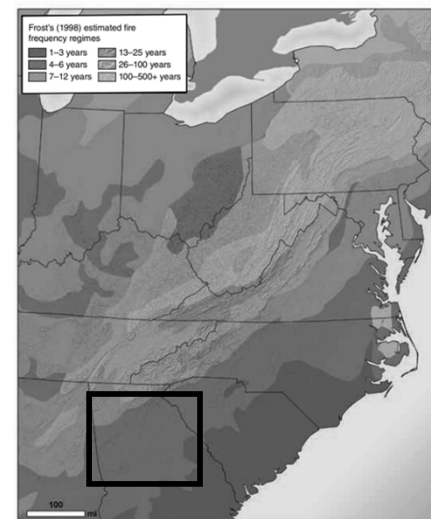
### Piedmont Region

#### Low Elevation Sites

- Fire Interval: Range 2 – 6

#### Dry/poor Sites

- Range: 6 – 15



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## Contemporary Fire Regimes

- Large-scale fire suppression
- Oak-dominated forests transitioning to shade-tolerant and fire-intolerant species (e.g., red maple).
- Pine forests experiencing competition from hardwoods



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## Contemporary Fire Regimes

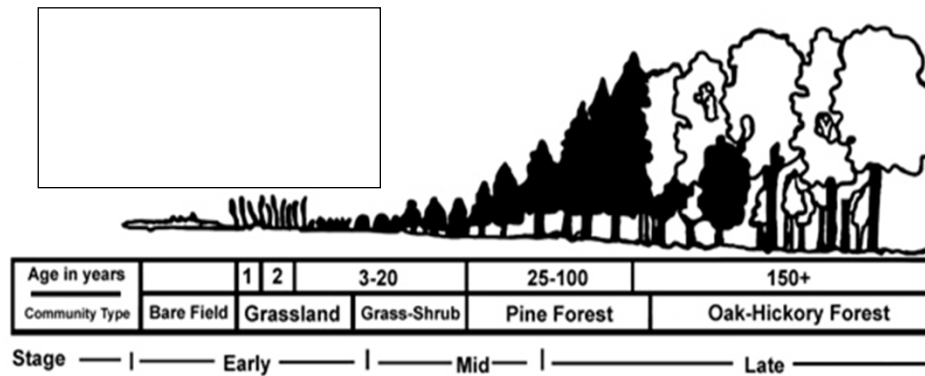
- Development of dense hardwood mid-story
- Intercepts sunlight
- Inhibits development of herbaceous groundcover
- Decline in habitat quality
- Moves beyond ability to restore with fire alone!



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## Wildlife Response = Canopy



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## Prescribed Fire

- Integral part of southeastern ecosystems.
- Prescribed Fire
  - Most important tool
  - Resets plant succession, controls hardwoods
  - Shapes understory structure and composition

\*\*\* Fire without thinning may not produce desired results



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# Bobwhite Habitat

## The THIRD Rule

- 1/3 forbs/legumes
  - 1/3 native bunch grasses
  - 1/3 shrub (woody cover)
- Achieved by Thinning & Fire Management



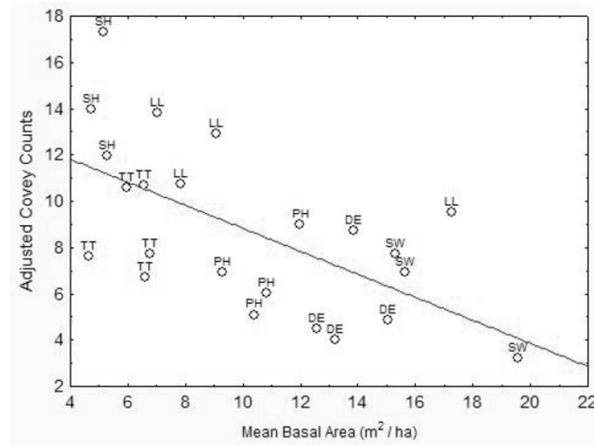
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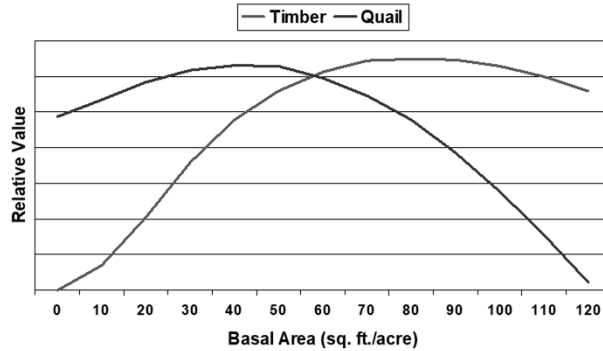
# Bobwhite Habitat



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# Bobwhite Habitat

Basal Area for Optimum Quail and Optimum Timber (mature) Value



**\*\*Important Note: Site index (esp. soil type), tree species and fire use will influence vegetation and bobwhite response ... annual rainfall**

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## Bobwhite Habitat - Fire

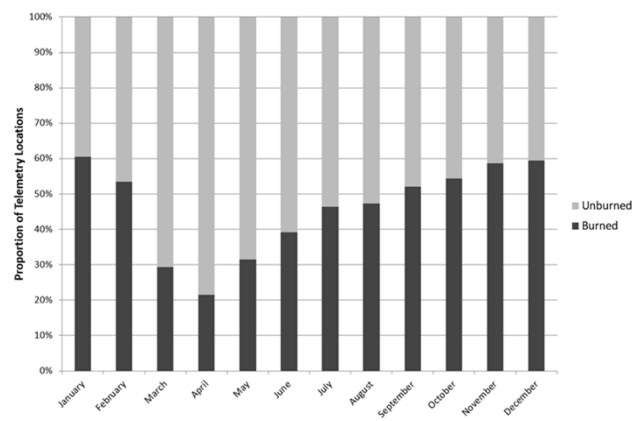
- Fire in Upland Pine Forests
  - Frequency
  - Season
  - Scale



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## Bobwhite Habitat - Fire

Frequency of Fire –  
time since burn (TSB)

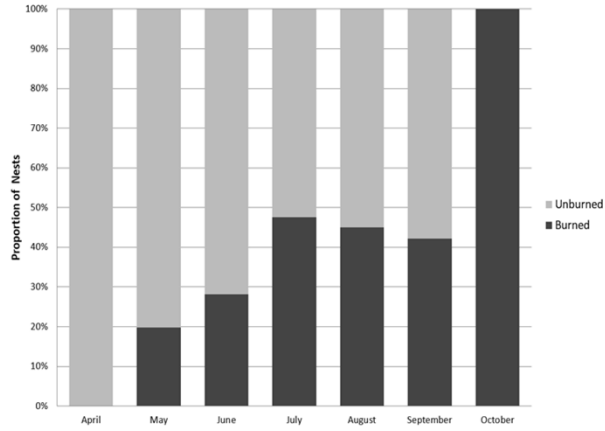


\*\* telemetry locations from TTRS (n >165,000). Majority of burning on TTRS occurs during March through April with moderate amount in May/June.  
\*\* Continual shift toward recently burned areas → 18 months post-burn

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## Bobwhite Habitat - Fire

Frequency of Fire –  
time since burn (TSB)



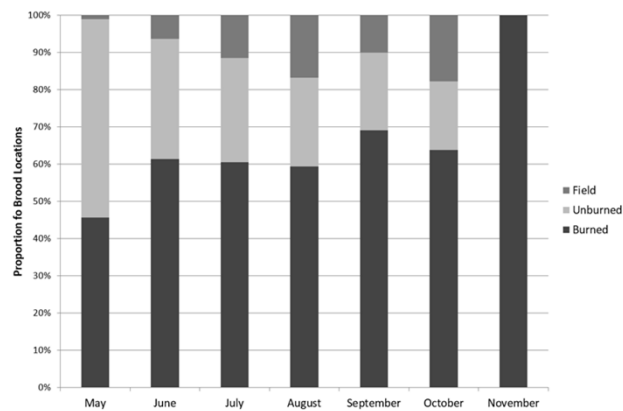
\*\* telemetry locations for **nests** on TTRS (n >2,300).

\*\* By July nearly 50% of locs are in recently burned areas. Likely a trade-off between raising young and nest survival

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## Bobwhite Habitat - Fire

Frequency of Fire –  
time since burn (TSB)



\*\* telemetry locations for broods on TTRS (n >130,000). As early as June, majority of brood use occurs in recently burned areas.

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## Bobwhite Habitat - Fire

Ideal:

Burn 45 -70% per year

Burn March – May

Burn 40 – 60 acre patches

Adjust to weather, ecosystem...

Never more than 3 years without fire,  
preferably 2-year fire return



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## Turkey Forage

**Wild Turkey Foods by Habitat Type**

Habitat	Foods		
<b>Openings</b>	<b>Grass/Seeds</b> Paspalums Panicums Legumes	<b>Forage</b> Clovers Grasses Sedges	<b>Insects</b> Grasshoppers Millipedes Insect Larvae
<b>Moist Bottomland</b>	Snails	Insects	Worms
<b>Pine Plantations</b>	Grasses, legumes, seeds	Herbaceous green forage	Insects, soft mast, pine seed
<b>Mixed Pine/Hardwood Stands</b>	<b>Soft Mast</b> Dogwood Blackberries Huckleberries Blackgum Spice Bush	Grapes Dewberries Blackhaw Cherries	<b>Seeds</b> Longleaf Pine Sweetgum Magnolia
<b>Mature Hardwood</b>	Acorns	<b>Hard Mast</b> Beechnuts	Pecans



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## Turkey – Habitat Use

- Thinning and fire dictate use
- Stands < 15 years serve as nesting cover
- Stands >15 years (thinned) most often used
- Hardwood areas!
- Openings!



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## Turkey – Fire

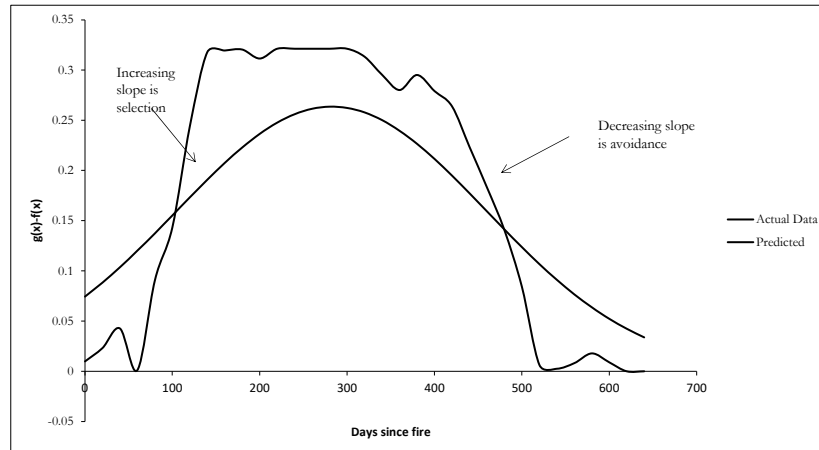
- Miller et al. 1999 “ 3-5 year might be adequate”
- Miller et al. 2000 “3-4 year is optimal”
- Miller et al. 2007 “3 to 7 years to improve habitat conditions for wild turkeys within intensively managed pine forests”



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## Turkey – Fire



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## Turkey – Growing Season Fire (South Georgia)

- ~10% of nests lost to fire – 75% of hens renested
- Only 1 of 30 broods lost to fire
- Hens initially (first 10 days) avoided fires
- Core use areas comprised of more stands burned during current season
- Home ranges dominated with stands burned within 2 years

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## Turkey – Fire

- Apply fire on a 2-3 year rotation depending on site productivity
- If you go past 3, you will likely lose your ability to control hardwoods in open pine stands
- Burning hardwood drains is beneficial—if you burn late winter and use cool fires—seek professional help
- Scale! 100 acre fire good, 1000 ac?



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## Turkey – Take Home

- Turkeys can make a living almost anywhere
- Diversity of habitats will ensure the greatest chance of maintaining high populations through time
- Don't be afraid to manage the system
- Timing is important-work with habitat during proper seasons
- Scale is important – fire



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## Pine Benefits to Deer?

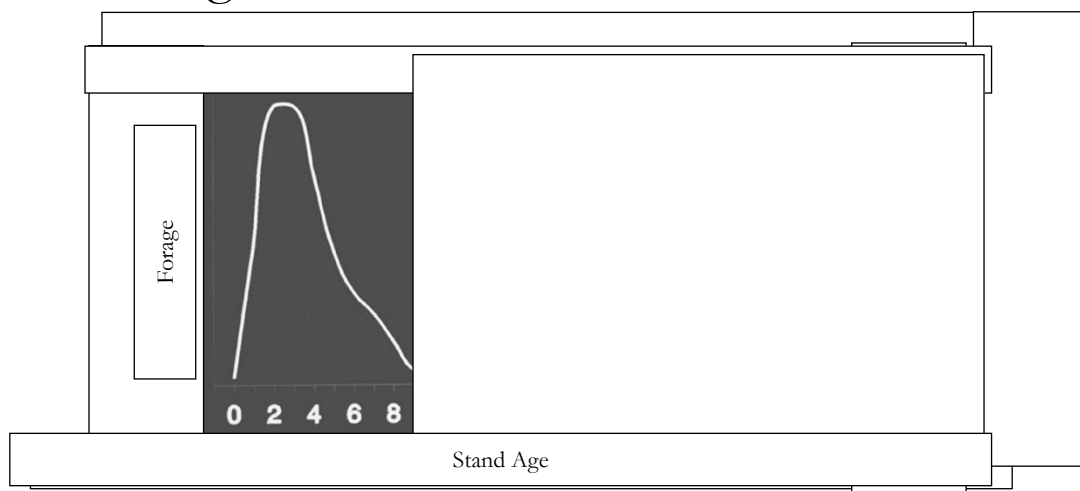
- For most species (including deer), the pines are not the habitat...
- Rather, we manage the pines to manage the habitat!



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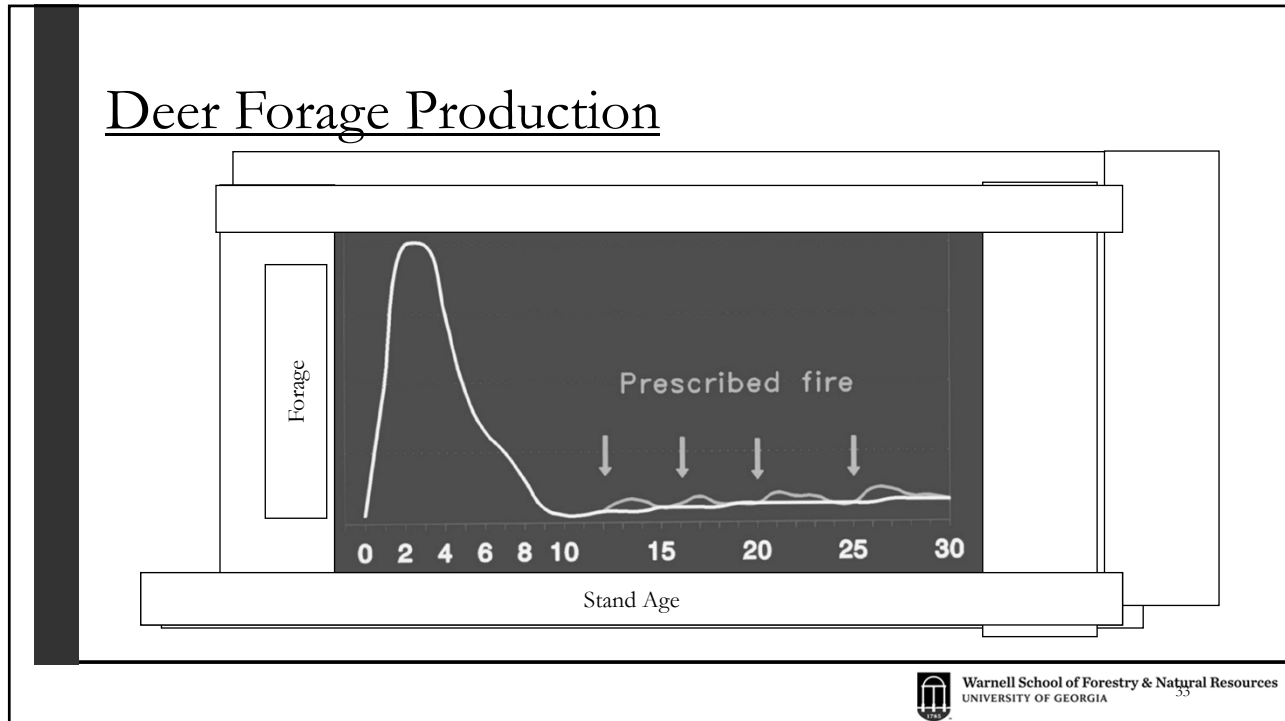
## Deer Forage Production



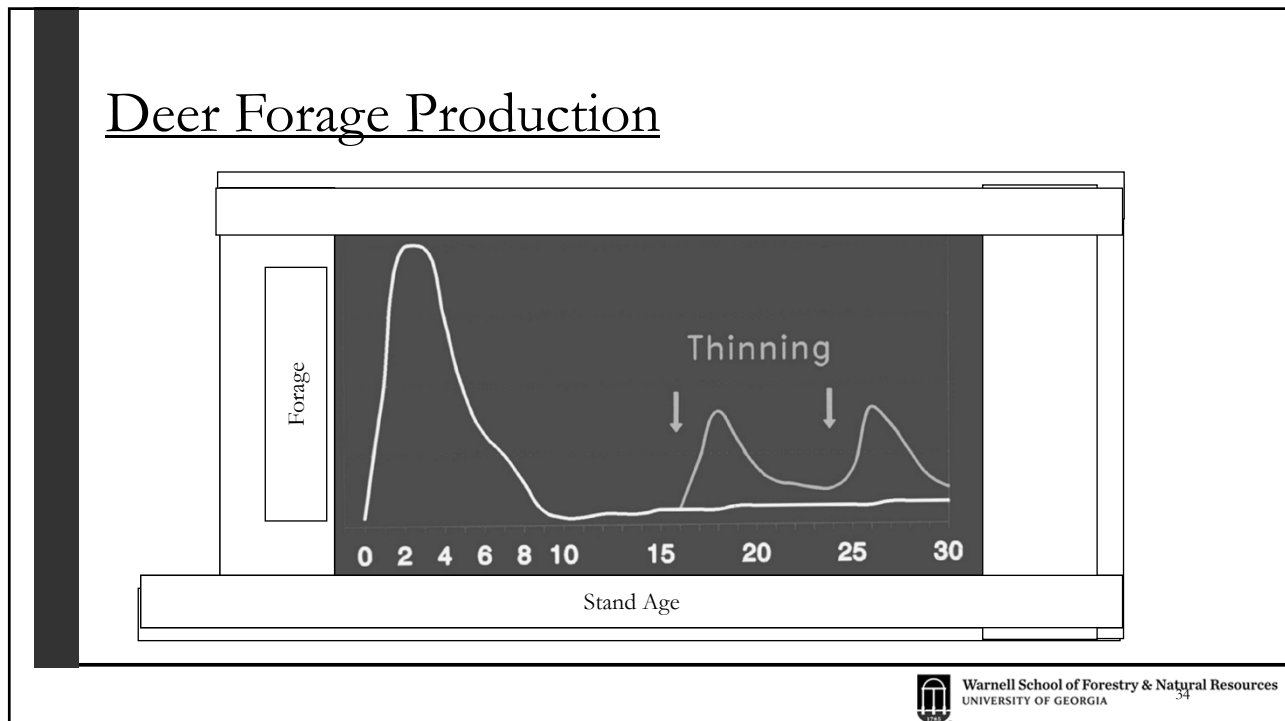
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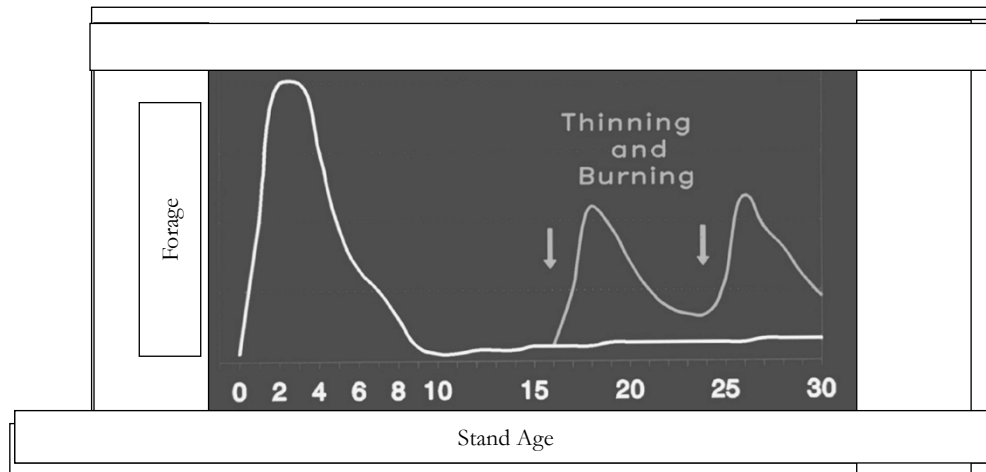


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## Deer Forage Production



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## Loblolly Pine Stands

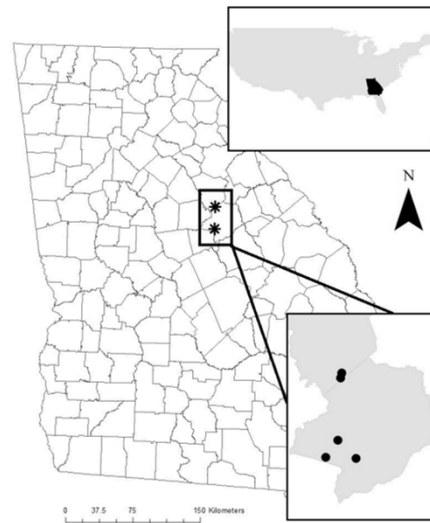
- 10% of forested lands in the Southeast



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## Loblolly Pine Stands

- 10% of forested lands in the Southeast
- 15–20 Year-Old Pine Stands



Keene, Stewart, & Gulsby. Ongoing Research. Auburn Deer Lab

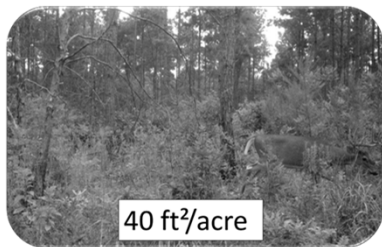


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## Loblolly Pine Stands

- 10% of forested lands in the Southeast
- 15–20 Year-Old Pine Stands
- 3 Thinning Levels



Keene, Stewart, & Gulsby. Ongoing Research. Auburn Deer Lab

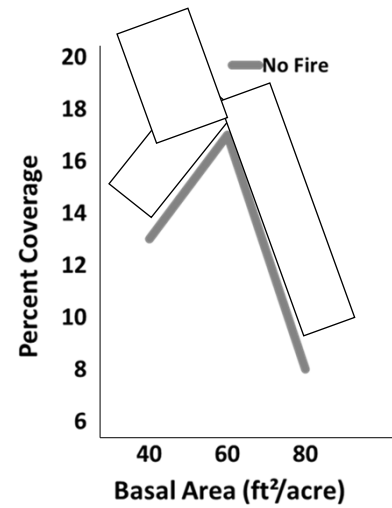


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## Loblolly Pine Stands

- Forb cover is directly related to canopy cover...



Keene, Stewart, & Gulsby. Ongoing Research. Auburn Deer Lab

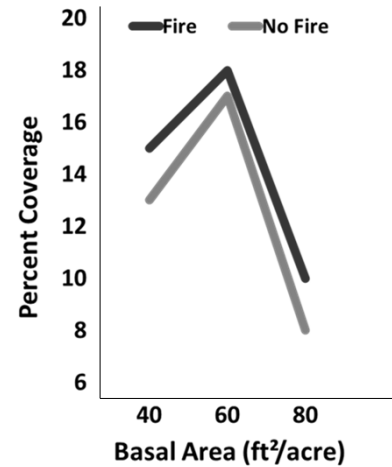


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## Loblolly Pine Stands

- Forb cover is directly related to canopy cover...
- Prescribed fire didn't influence overall amount of forage.....



Keene, Stewart, & Gulsby. Ongoing Research. Auburn Deer Lab

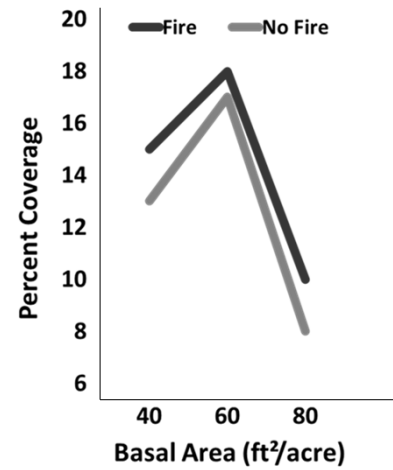


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## Loblolly Pine Stands

- Forb cover is directly related to canopy cover...
- Prescribed fire didn't influence overall amount of forage.....
- But did change which plants were there!
  - 11 x more ragweed in burned plots
  - 18 x more pokeweed in burned plots



Keene, Stewart, & Gulsby. Ongoing Research. Auburn Deer Lab

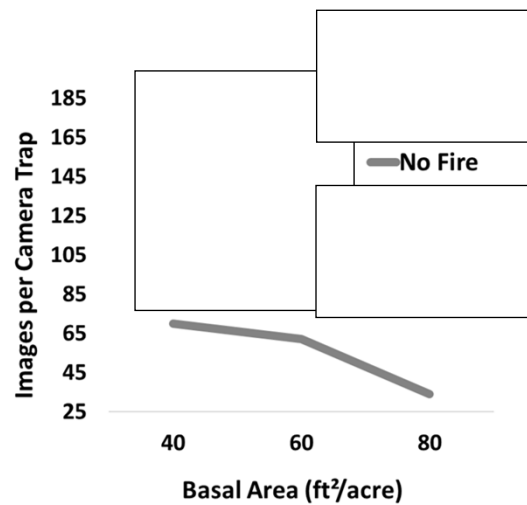


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## Loblolly Pine Stands

- Thinning was important,

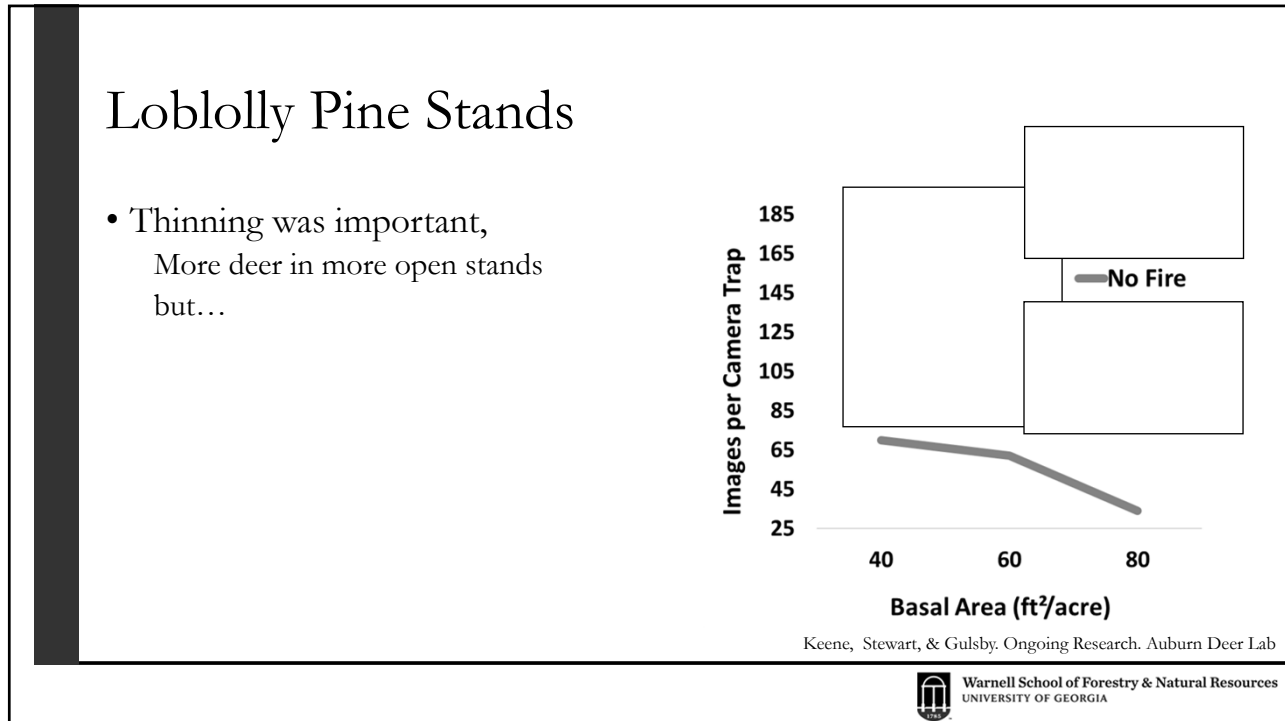


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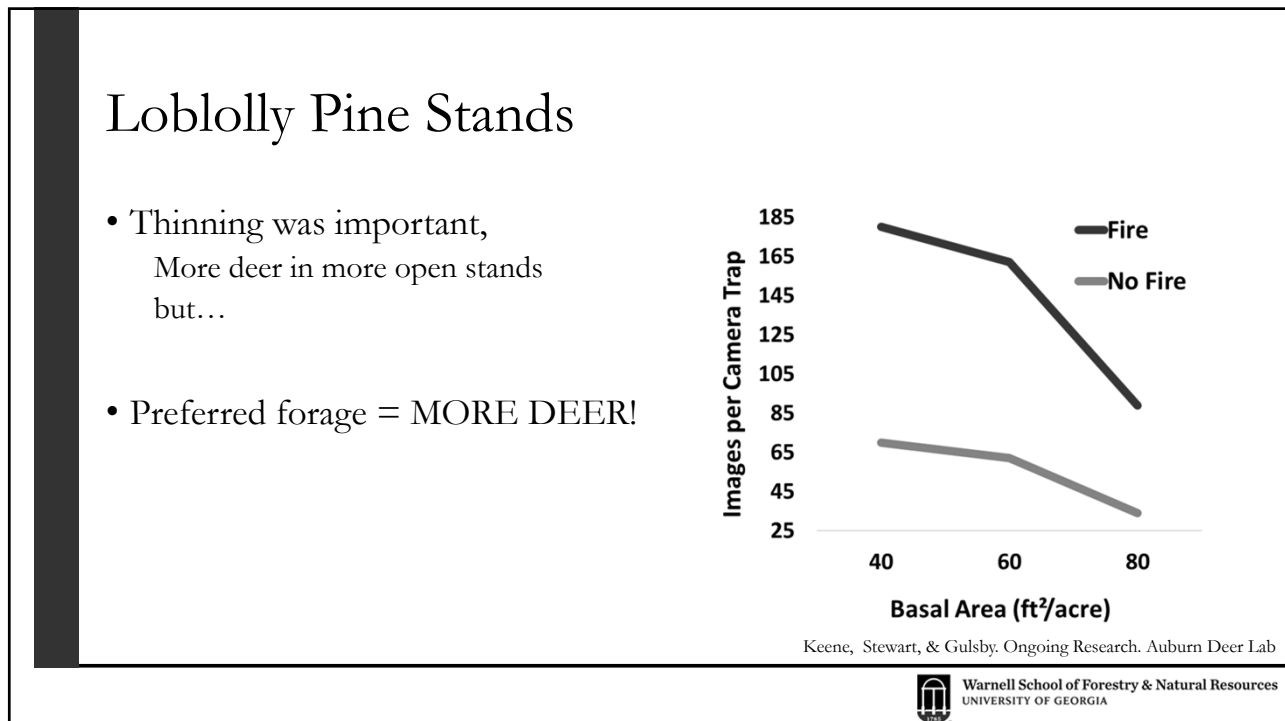


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## Recommendations – Pine Systems

- Recommended –
  - 3 -5 year burns
  - (Same for Turkey, Rabbits)



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## Hardwood Benefits to Deer?

- Here, the trees **CAN BE**  
most of the habitat



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## Hardwood Benefits to Deer?

- Here, the trees **CAN BE** most of the habitat
  - Mast Producing Species



Hard  
Mast



Soft  
Mast



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## Hardwood Benefits to Deer?

- Here, the trees **CAN BE** most of the habitat
  - Mast Producing Species
- Don't be afraid to manage though!

High Canopy  
= Low Forage



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## Hardwood Benefits to Deer?

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- Don't be afraid to manage though!

High Canopy = Low Forage  
 = More Predation



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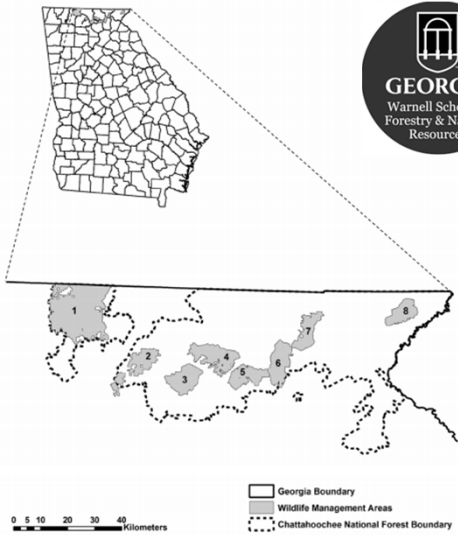
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# North Georgia Deer Study

- Deer Harvest Data: 1979 – 2018
- Forest Stand Data
  - Oak Volume
- Prescribed Fire Data: 2003 - 2018





**Figure 1.** Wildlife management areas used in study (Blue Ridge WMA [1], Rich Mountain [2], Blue Ridge [3], Cooper's Creek [4], Chestatee [5], Chattahoochee [6], Swallow Creek [7], and Warwoman [8]) located in north Georgia.

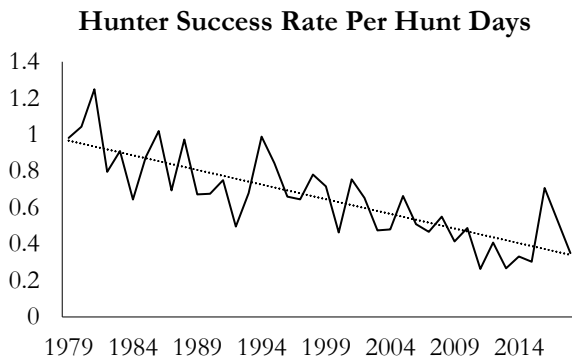



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# North Georgia Deer Study

- Deer harvest success has been cut in half in 40 years.



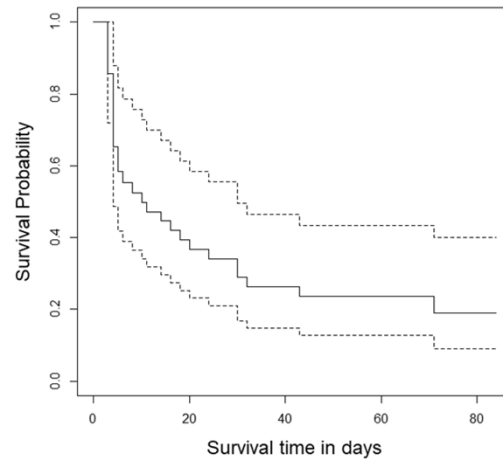


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## North Georgia Deer Study

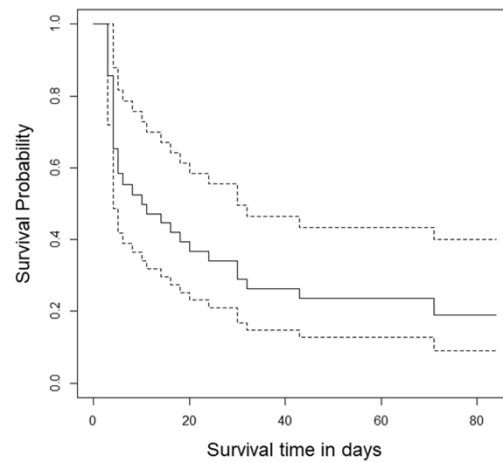
- Deer harvest success has been cut in half in 40 years.
  - Fawn survival = 18.9%



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## North Georgia Deer Study

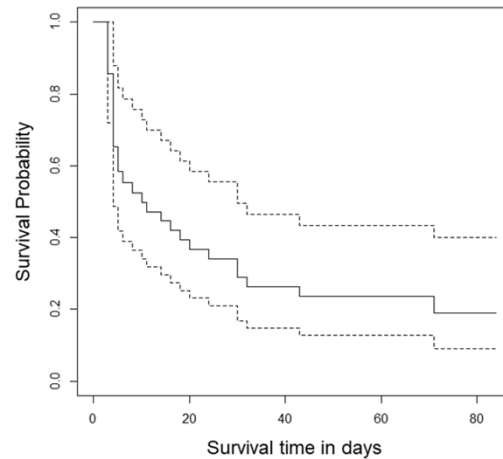
- Deer harvest success has been cut in half in 40 years.
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  - High predation



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## North Georgia Deer Study

- Deer harvest success has been cut in half in 40 years.
  - Fawn survival = 18.9%
  - High predation
    - 28 Fawns monitored

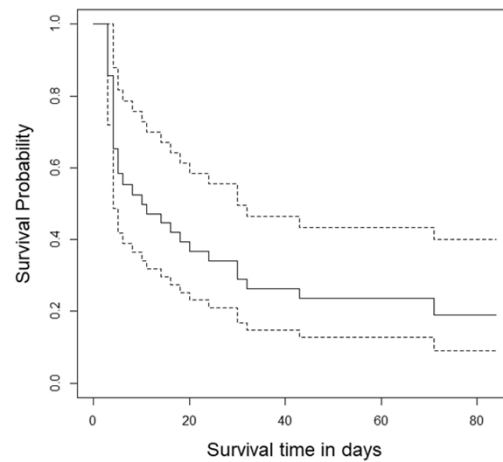


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## North Georgia Deer Study

- Deer harvest success has been cut in half in 40 years.
  - Fawn survival = 18.9%
  - High predation
    - 28 Fawns monitored
    - 24 Mortalities

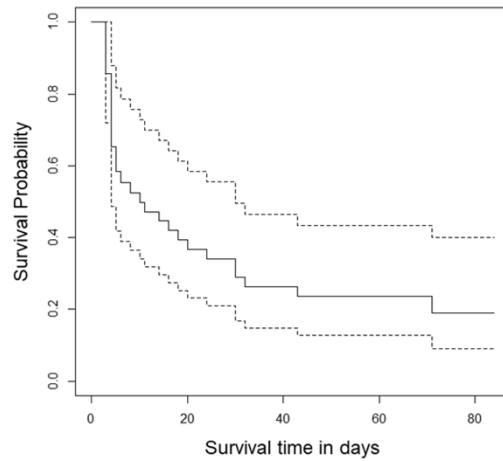


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# North Georgia Deer Study

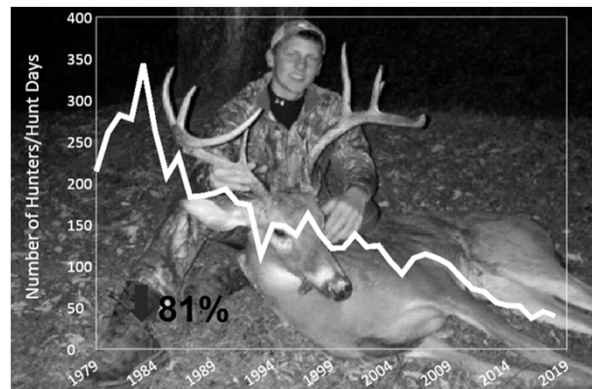
- Deer harvest success has been cut in half in 40 years.
  - Fawn survival = 18.9%
  - High predation
    - 28 Fawns monitored
    - 24 Mortalities
    - 18 Predator-caused



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# North Georgia Deer Study

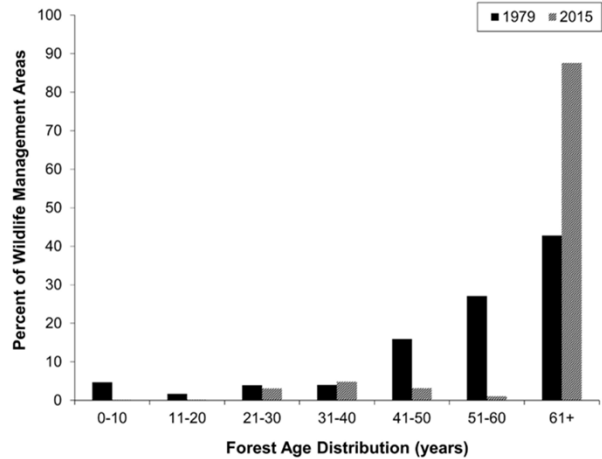
- Deer harvest success has been cut in half in 40 years.
- Declining hunter numbers



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## North Georgia Deer Study

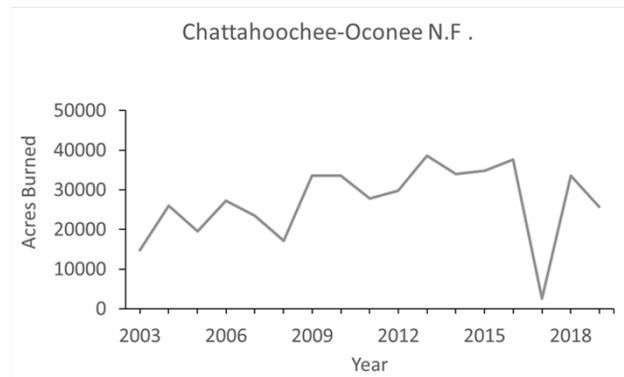
- Deer harvest success has been cut in half in 40 years.
- Declining hunter numbers
- Forest stand age is increasing.



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## North Georgia Deer Study

- Deer harvest success has been cut in half in 40 years.
- Declining hunter numbers
- Forest stand age is increasing.
- Despite active management.



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## Prescribed Fire + Deer

- Fire + Closed Canopy =  
Little forage increase.



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Prescribed Fire + Deer

- Fire + Closed Canopy =  
Little forage increase.
- Fire + Thinning =  
8 X more forage.



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Prescribed Fire + Deer

- Maintains forage within the reach of deer



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Prescribed Fire + Deer

- Maintains forage within the reach of deer
- Stimulates seedbank germination.



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Prescribed Fire + Deer

- Maintains forage within the reach of deer
- Stimulates seedbank germination.
- Fawning cover



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Recommendations – Oak-Pine Systems

- Burn openings every 1-3 years.



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Recommendations – Oak-Pine Systems

- Burn openings every 1-3 years.
- Low-intensity fire every 3–5 years may be used in forests with a broken canopy to stimulate forage.



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Recommendations – Oak-Pine Systems

- Burn outside fawning season (May–July).



Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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## Recommendations – Oak-Pine Systems

- Burn outside fawning season (May–July).
- Burn late growing and dormant seasons for greater diversity of cover and expand periods of high-quality forages.




Warwick & Harper. [extension.tennessee.edu/publications/Documents/PB1869.pdf](http://extension.tennessee.edu/publications/Documents/PB1869.pdf)



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